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THE SOUTHERN APPALACHIAN BOTANICAL CLUB

All persons interested in the botany of the Southern Appalachian Mountains are invited to join the club. Dues, including subscription to the Journal, are $3.00 per year. Single copies of *Castanea,* seventy-five cents.

Notes and short scientific papers relating to the botany of the region are welcomed and will be published to the extent that the size of the Journal allows.

Authors will receive six gratuitous copies of the issue in which their papers appear. Separate reprints, if ordered in advance, will be furnished at cost.

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With Fernald and Long in Southeastern Virginia

DONOVAN S. CORRELL

These anecdotes are not here recorded with any thought of pretense, but rather to show that, from one individual's experience, Professor M. L. Fernald had other sides to his character than that of severe botanical critic in which alone he was known to so many botanists. Indeed, in the field, no more congenial companion could be found. Though my short field experiences with Fernald and Bayard Long probably makes me less qualified than many to publish such comments as these, I do have the distinction of having spent most of this time in observing and enjoying Fernald rather than in botanizing—a somewhat Boswellian approach. I discovered almost within the first hour in the field in southeastern Virginia that there was very little of interest and value that I could provide in the way of botanical material. All my efforts at collecting produced only such comments as "common stuff," "we have it from ten counties, already," as the specimens were tossed aside. Hence, I devoted my time to more pleasurable pursuits.

In 1938, my wife and I had planned with Professor Fernald and Mr. Long to make a trip of several days to southeastern Virginia in order to visit some of their prize botanical haunts to gather fruits and seeds of what they considered to be unique plants. This trip was to follow the AAAS December meetings being held in Richmond that year. Before leaving North Carolina, where we had been vacationing, my wife obtained a pair of opossums (herein lies a tale) to take back to Wellesley College where she was then teaching zoology. Upon arriving in Richmond we left our caged opossums under the porch of the rooming house where we were staying.

With the Science meetings over and the opossums cached in Richmond, the four of us headed into southeastern Virginia on our botanical foray. Since I had been brought up in the south and was supposedly familiar with the longleaf pine (*Pinus palustris*) in all phases of its growth, Professor Fernald thought it would be a good time to investigate a report of its occurrence south of Franklin. Some few years before, the inimitable Roland Harper had reported that while he was riding on a train between Franklin, Virginia, and the North Carolina line, he had seen from the window large trees of longleaf pine growing within sight of the railroad. Although we searched along what we considered to be this railroad near the North Carolina line, as well as elsewhere in the vicinity, we could find no longleaf pine. We called it a day and returned to Franklin to spend the night.

The dining room in the little hotel in Franklin was dimly lighted and the white-coated negro waiters were like apparitions standing in the dark recesses of the old hall. We were soon served soft-shelled crabs and a delicious salad over which was sprinkled small, slightly curved, strongly ribbed seeds which at once aroused our curiosity. Professor Fernald fished out an individual seed on a tine of his fork and, to the surprise and concern of our overly-attentive waiter, began examining it closely under a hand lens. After a quick study he assured us that it was from an umbelliferous plant of some kind. We all expressed our opinions as to the possibility of the plant being cultivated in the vicinity for use as a condiment. Calling our waiter, Professor Fernald asked about the plant from which the seeds were obtained. The colored boy professed to know nothing except that the seed had been taken "out ob a box." We asked to see the container and to our surprise he brought out a box of celery seeds!

The next morning, with no more thoughts of longleaf pine, we drove to one of Fernald and Long's oft-visited haunts south of Zuni in Isle of Wight County. It was an extremely interesting place, botanically, and there were many unusual species growing in the open pinelands. Long had long since found a rare moss, *Buxbaumia aphylla*, in the sandy lichen-covered soil under a grove of large pine trees nearby. We were wandering around intent on finding some fruiting herbaceous plants when my New England-born wife, who had spent some time in the Carolina Low Country, pointed to some long tufted plants which the rest of us had been stumbling over and

exclaimed, "Why, there is a longleaf pine seedling!" Sure enough, all about our feet were beautiful grass-like clumps of long yellow-green needles of longleaf pine seedlings. Fernald and Long stood staring at the plants in a state of mixed emotions—a kind of uncomprehending pleasure. Fernald was pleased and at the same time somewhat surprised and baffled at not having found the plant before on one of his and Long's many forays to this spot. Since they had never seen longleaf pine seedlings they had mistaken them for a grass, and they now recalled several other stations in Virginia where they had seen this "grass" growing.

We all acted like children hunting Easter-eggs as we eagerly looked for more and more longleaf pines. They were everywhere, from the seedling stage to old patriarchs, some of which were several feet in diameter. These latter trees had fortunately escaped the logging of long ago, which was everywhere evident, because they happened to be gnarled and warped and thus were unfit for lumber. Long quickly scrambled up a young tree and, clinging to a branch, he posed to make a memorable photograph. The finding of this station for longleaf pine made the trip completely successful and we were content to return to Richmond.

Arriving in Richmond late Sunday afternoon we could find but few restaurants open, and these were the most fashionable. We were torn, and in appearance unkempt and disheveled, but we were also famished and quite willing to swallow our pride—provided some food went down with it. After Fernald suggested that he would walk in first so that everyone would be sure to look at him and thus perhaps overlook our general wretched condition, we mustered sufficient courage to tackle an exceptionally fastidious and noted restaurant. My wife's stockings had been shredded by catbriers and prickly dewberry vines and she was a far-cry from what one would consider presentable, so Fernald and I sandwiched her in between us with Long timorously bringing up the rear. In this order we ran a gauntlet of disapproving stares. Fernald, however, received the brunt of the lifted eyebrows of these censuring epicures, and I seriously doubt whether the rest of us were noticed at all. With his neat white beard, twinkling blue eyes and ruddy cheeks, coupled with his Santa Claus physique, he easily attracted attention to himself.

Although we were successful in parading the entire length of the restaurant, we had no sooner been seated than a negro waiter, armed with a flashlight, came crawling around our table. Lifting the cloth,

he flashed the light directly upon my wife-s ill-clad legs. He said he was looking for a diamond ring, but we believed he wanted to see if what he thought he saw was really so! Anyway, he provided us with a most relieving bit of laughter. We ordered pork chops and after dinner, remembering the poor hungry opossums, we carefully and unobtrusively wrapped all the bones and "leavings" in some paper napkins and put them into a knapsack. I suppose our wall-

Plate 1.--Longleaf pine in Isle of Wight County, Virginia: Top, Fernald examining a branch tip, the author, and Mr. Long. Left, an old tree. Right, Mr. Long hugging a sapling.

eyed waiter is still wondering if we ate those bones, because we looked fierce enough to have done so, for with a questioning hesitancy he asked us if we wanted, perhaps he meant "needed," any desert!

In October 1941, I spent about ten days chauffering Fernald and Long throughout southeastern Virginia. The Century House, just south of Petersburg, was, as in the past, their base of operations. It seemed to me that it would have been much better to have had a few sub-bases throughout southeastern Virginia rather than to make the long journey every day to remote collecting grounds and back again after dark to Petersburg. I, however, kept such opinions to myself.

We started on a long jaunt the first day, I enjoying the country and Fernald and Long, to my amazement, keeping their heads between the pages of an Ellery Queen detective story and a copy of "My man, Jeeves." Knowing these men to practically eat, sleep, and live the subject of Botany, I was most pleasantly surprised to find them trifling their valuable time away on what might be considered non-essentials by some people. Instead of having their noses in a copy of "My man, Jeeves," I fully expected them to be considering a tome on Fundamentals of Physical Science or some weighty work on the Phytogeographic Relationship of Plants. Considering that Fernald was usually rather enthusiastically willing to discuss any or all phases of his work, I was rather concerned when he seemed more inclined to read Ellery Queen than to deal in trite botanical subjects, and when both men took their stories into restaurants and ordered their meals between lines of "My man, Jeeves" and Ellery Queen, it seemed to me that they were, after all, human and not the botanical drudges which most of us eventually become!

As I have noted before, there was no use in my trying to contribute anything of botanical interest to our party although southeastern Virginia was virgin territory as far as I was concerned. Everything, with one notable exception, that I laboriously gathered and brought to the seat of knowledge was promptly duffed as "old stuff" by these old timers. It was to my chagrin that I did throw a temporary bit of excitement into our midst a few days later.

It so happened that after having given up the idea of trying to contribute something worthwhile to the fern and flowering plant collections, I turned to my usual diversion of picking up mosses and liverworts. Also, from time to time, I chased grasshoppers for Mr. Long's collection. I was pressing each moss and liverwort collection

in previously used one-pound kraft paper bags which I happened to have with me. One evening, after having spent part of the day collecting in a particularly lush wooded ravine along the Rappahannock River, I was straightening and sorting out my collections when suddenly I noticed a solitary small, slender, translucent claviform leaf in one of my collections. Examining it through my lens I saw projecting beyond the leaf margin a flaring tubular sporangium. I started with excitement—here was a frond of *Hymenophyllum*, a filmy-fern! After verifying my conclusions, I walked into the room where Fernald and Long were busily engaged arranging the day's collections in presses, and with suppressed excitement and forced nonchalance I dropped my bombshell in their lap. There was debate! Could it be possible that I had accidentally picked up one lone frond of filmy-fern in a mass of mosses from that lush ravine? Should we make the return trip the next to verify this possibility? In view of the fact that filmy-fern had been found in West Virginia, it was within the realm of possibility that the fern might be found in eastern Virginia. Fortunately, we decided against returning the next day and we postponed action until after further consideration. When the heat of excitement had died down and I lay in bed that night considering the matter I then recollected that the paper bags I had been using had been previously used and, now I could see the whole thing—one of those bags had contained my collections of filmy-fern from Big Estatoe Creek in South Carolina and doubtless a lone frond had been left in the bag. Imagine my mortification. I never mentioned the subject again! This little incident illustrates very well that in scientific research one can never be too sure of one's facts.

The fine black walnuts which grow so luxuriantly in Tidewater Virginia were just dropping their rich ripe fruit in the sandy soil. Fernald expressed a desire to have some to take back to his daughter. Consequently, also being very fond of them myself, I devoted an afternoon to the gathering and shucking of a goodly quantity of nuts. The gloves which I wore were useless against the penetrating stain from the juicy husk and my hands became the color of old walnut furniture. This was most embarrassing to me in the restaurants of Petersburg. We would usually enter a restaurant in our field clothes after the day's work. Fernald made great joke with the attractive young waitresses about my being a day laborer and house painter, with my apologies to those honorable workmen!

Probably some of the most amusing recollections of Fernald in action are those of him jumping from a small boat into the water

and mud of the Rappahannock in quest of aquatic plants. It was my task to keep a stubborn outboard motor going and at the same time try to steer the boat into desired collecting grounds. I would be overwhelmed with these duties when all of a sudden Fernald would grab hold of the gunwale, heave a sigh, and jump out into an unknown depth. The poor little boat, almost capsized, would bob about while I struggled to keep the motor from going overboard. Time and again Fernald would jump into water well over his waist to get a desired plant and the same agonizing routine had to be repeated each time.

It was only darkness, itself, that would bring to an end the day's work, and even then Fernald would often try a little botanizing by "feel." I am sure that Fernald must be even now botanizing in Elysian fields.

Division of Plant Exploration and Introduction
United States Department of Agriculture

Xerophyllum asphodeloides (L.) Nutt. in the Massanutten Mountains in Virginia

LENA ARTZ

The Massanutten Mountain System in Virginia, lying between the Blue Ridge on the east and the Alleghenies on the west, divides the Shenandoah Valley into two parts for a distance of about 49 miles. Along the western base of the Massanutten mountains meanders the beautiful north fork of the Shenandoah River. Equally lovely and equally meandering, the south fork of the Shenandoah flows along the eastern base of the mountains.

The northern end of the range, Signal Knob, near Strasburg, Shenandoah County, Virginia, has an elevation of about 2000 feet. From this Knob the mountain descends abruptly to the Valley floor. With similar abruptness, the Peak, with an elevation of 2900 feet, terminates the southern end of the range, near McGaheysville, Rockingham County, Virginia.

The chief geologic formations of the Massanutten are: Massanutten sandstone, a hard quartzite of Clinton formation; Martinsburg shale of the Ordovician, found chiefly on the outer western slopes; Romney and Jennings shales of the Devonian in the small valleys within the range; and Helderberg limestone which crops out, usually, in the stream beds.

The mountain system as a whole is made up of small, more or less parallel, ridges consisting chiefly of quartzite and soils derived therefrom. These ridges, cut transversely here and there by mountain streams, usually end abruptly in steep quartzite cliffs.

Beginning about three miles north of New Market Gap on Catback mountain, about 25 miles from the northern end of the range, and extending southward for a distance of some 20 miles *Xerophyllum asphodeloides* (L.) Nutt., a member of the lily family (Liliaceae), and commonly associated with plants of the New Jersey Pine Barrens, is a conspicuous element in the vegetation of the dry, sandy soils of the western slopes of some of the inner ridges.

On Catback and on Waterfall mountains this *Xerophyllum* extends from near the base of the ridges to the mountain tops. The abruptness with which *Xerophyllum* and its associates stop at the mountain crest is quite striking. In contrast, the eastern slopes with tall trees and open woods present a very different appearance. On these western slopes *Xerophyllum* and its associates form an almost impenetrable thicket. Chief among the associates of *Xerophyllum* on

these rocky slopes is *Quercus ilicifolia*, scrub oak, or bear oak. (Professor Ruskin Freer, Lynchburg College, Virginia, states that a local name for this oak is shin breaker. Anyone traversing such a thicket might escape without a broken shin, but not without a broken skin.) Waterfall mountain ends on the north side of New Market Gap in a precipitous quartzite cliff on the top of which *Aralia hispida* Vent. is associated with *Xerophyllum asphodeloides*.

Just south of New Market Gap on a ridge extending from Big Flats toward Roaring Run (although this Run is here unseen for some distance, it is quite distinctly heard in its underground bed) *Xerophyllum* is associated with *Solidago odora* Ait. Still farther south on Middle Mountain in the Pitt Spring Fire Lookout area *Xerophyllum* grows sparsely on and near the mountain crest. A greater proportion of tall trees in this area no doubt accounts for sparse growth of this plant here. The areas mentioned from Catback Mountain to Pitt Spring, inclusive, are in Page County, Virginia. Beginning at Ruckle's Gap (Runkle's Gap), Rockingham County, and extending southward toward Harshberger's Gap in the same county, *Xerophyllum* grows in profusion for some two or three miles along the crest and western slope of Middle Mountain. Here the dense mats of *Xerophyllum*, with its long, slender grass-like leaves, intermingled with a few herbaceous plants, low shrubs and sparse growth of trees, present, at a casual glance, the appearance of a grassy ridge.

The most frequent plant associates of the *Xerophyllum* in the areas mentioned are: *Cladonia spp.*, *Pteridium aquilinum* (L.) Kuhn., Mill., *Iris verna* L., *Quercus ilicifolia* Wang., *Q. marilandica* Muench., *Lycopodium tristachyum* Pursh., *Pinus pungens* Lamb., *P. virginiana*, *Rhododendron nudiflorum* (L.) Torr., *R. canescens* (Michx.) G. Don., *Epigaea repens* L., *Gaultheria procumbens* L., *Gaylussacia* spp., and *Vaccinium* spp.

To sum up briefly, for a distance of some 20 miles in the southern half of Massanutten Mountains in Virginia, *Xerophyllum asphodeloides* is a conspicuous feature on the dry, sandy soils of the western slopes of the quartzite ridges that lie within the outer ridges of the Massanutten Mountain System. Wherever it occurs in these areas its plant associates are essentially the same.

In addition to Page and Rockingham counties, other counties in Virginia in which this *Xerophyllum* is known to occur are Bedford, Augusta, Craig and Roanoke counties.

WATERLICK, VIRGINIA

The Status of Ilex collina Alexander*

FRANK WOODS

In 1936, A. B. Brooks reported the discovery of *Ilex longipes* Walt. in West Virginia. Several years later, Maurice Brooks (1940) reported the discovery of a yellow fruited form of this species and subsequently named it forma *Van Trompii*. In 1941, E. J. Alexander, who had been studying plants of the same species but from a different locality for a number of years, named the species *I. collina*. Following this, in 1940, Core and Davis transferred the yellow fruited form to this species. In the eighth edition of *Gray's Manual of Botany* (1950), Fernald regarded the long pedicelled holly of Virginia and West Virginia as being identical with *I. longipes*. There are several reasons why the latter is not a satisfactory treatment, and the writer suggests that Alexander's name be used.

As Alexander has shown, there are differences between *I. longipes* and *I. collina* in the marginal spines and lower leaf surface and in the sepals. Because of the limited number of specimens at his disposal for study, he failed to see the range of variation in the striation of the nutlets. The writer, who has been able to study a larger number from a wider geographical range, finds that the nutlets may be much more smooth than stated in the original description of the species (Alexander, 1941).

The affinities of this species lie with *I. verticillata* rather than with *I. montana*, as thought by Alexander. The deeply impressed venation approaches that of *I. verticillata* rather than *I. montana*. This is also true of the thickness and number of marginal teeth of the leaf blades and the shape of the calyx lobes.

The foregoing observations were based on the following specimens:

M—Missouri Botanical Garden
T—Herbarium, University of Tennessee
W—Herbarium, West Virginia University

WEST VIRGINIA. Nicholas: riverbank near Richwood, *A. J. Sharp, June 22, 1940* (T); C. C. C. Camp Woodbine, *R. Burton, June 23, 1937* (W). Pocahontas: Cranberry Glades, *Tryon, Bartels & Smith, Sept. 28, 1946* (W). Randolph: bank of Cheat River in open woods, *A. J. Sharp, July 5, 1940* (T,W); Red Run, Cheat Mt., *Eugene Hutton, Aug. 13, 1940* (T, M, W); Blister Run near Cheat Bridge, *R. E.*

*Contribution from the Botanical Laboratory, The University of Tennessee, N. Ser. No. 137.

Shanks, Sept. 7, 1950 (T); near White Top of Cheat Mt., *M. G. Brooks, Oct. 19, 1941* (T); Cheat Bridge on the Staunton Pike, *Alfred Rehder, Aug. 27, 1907* (M); bank of Cheat R., *A. J. Sharp, 1070* (M); Cheat Bridge, *Maurice Brooks, Sept. 16, 1939* (W); Cheat Mt., Carr Top, *E. E. Hutton, Aug. 27, 1938* (W); Cheat Mt., *A. J. Sharp, Aug. 13, 1939* (T,W). Webster: near Camden-on-Gauley, *W. B. Fox, Aug. 10, 1940* (W).

VIRGINIA. Giles: above Big Cascades, Mt. Lake, *A. J. Sharp, July 30, 1943* (T); cranberry bog in Little Meadows, valley of Little Stony Creek, *R. E. Shanks, July 16, 1950* (T).

This list includes several stations previously unreported in the literature. The present known range of the species is from Randolph County, West Virginia, to Smyth County, Virginia. *Ilex longipes* does does not overlap the range of *Ilex collina* at any place and does not fall within the geographical range covered by *Gray's Manual* (1950).

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UNIVERSITY OF TENNESSEE

KNOXVILLE, TENNESSEE

A White Form of the Seashore Mallow, Kosteletzkya virginica

CLYDE F. REED

KOSTELETZKYA VIRGINICA var. AQUILONIA forma **alba** Reed, **form. nov.** Flores albae. Swamps and tidal marshes along Choptank River, Cambridge, Dorchester County, Maryland. August 26, 1941. *Clyde F. Reed 3841.* Type deposited in the United States National Herbarium. Co-types in Gray Herbarium and Reed Herbarium.

The Seashore Mallow is one of the more showy plants of the marsh flora of Maryland and Delaware. The smaller rose-colored flowers set it off from the White, Rose, or Red-Eyed Marsh Mallow, or Swamp Rose. They both like brackish waters and are often found together in our region.

In a tidal marsh along the Choptank River near Cambridge several plants with pure white flowers were found in 1941, and were still flowering so in 1950 when the locality was revisited by the author.

In the 8th Edition of Gray's Manual, no mention of this white-flowered Seashore Mallow is made, the description reading . . . . "petals roseate . . . .". As for the rest of the characters of this white-flowered plant, they best fit those of variety *aquilonia,* in having the flowering calyx 6 to 10 mm. high, and the bractlets about 5 to 6 mm. long, with petals up to 3 cm. long and the pedicels of the flowers equaling or longer than the bracteal leaves. The majority of the specimens of the rose-colored variety from Maryland and Delaware also possess the above characters.

Other white-flowered specimens have been collected in Anne Arundel County, Maryland (Aberdeen Creek, South River, August, 1938, *Lula A. Miller,* (USNH #1895187), in wet places covered at high tide).

The Seashore Mallow is known from mid New Castle County, Delaware, southward along the shore of the Delaware River and Delaware Bay to the shores of Maryland and Virginia along the Atlantic Ocean. In the Chesapeake Bay it extends from Crisfield northward to near the mouth of the Susquehanna River at Havre de Grace, on both sides of the Bay, and finally up the Potomac River as far as Charles County, Maryland. Inland it is confined to the Coastal regions along those tidal rivers which are affected by the Chesapeake Bay.

REED HERBARIUM, HARFORD AND CUB HILL ROADS,
BALTIMORE, MARYLAND.

Drying herbarium specimens slowly or rapidly

H. A. Allard

The preparation of good herbarium plant material involves much care and labor, and even artistic sense. There is a best way from the time the branch or plant is selected and gathered, through its arrangement of stems, leaves, flowers, and perhaps fruit, prior to pressing and subsequent drying in the plant press. Some collectors make excellent specimens, and take a real pride in good work; others are hurried and careless in all their work from beginning to end. Since a specimen is intended to serve as a permanent and authentic record of actual material, to be used for reference and comparison in future studies for many years, the longer it retains its original likeness as an undamaged dried specimen in spite of subsequent handling and study, the more satisfactory it has proven to be.

Reading Dr. Fernald's note "Injury to Herbarium specimens by extreme heat", Rhodora 47: 258-260, 1945, it occurred to me that it might be of some interest to present a few facts on changes taking place in plants dried under different conditions, and why too rapid drying may not always prove desirable.

The plant material for the herbarium which the field collector is most interested in, whether it is annual or perennial, is gathered preferably in the flowering and fruiting stage. This is generally the stage when the plants are in full leafage and the formation and mobilization of food reserves is at a maximum. One plant probably serves as well as another for study of the general effects of drying or curing. The Division of Tobacco Investigations of the U. S. Dept. of Agriculture has given considerable study to the effects of different methods of curing tobacco, to which the various types are subjected in their respective regions to obtain particular desirable characteristics.

The drying of plants for the herbarium is fundamentally a curing method comparable to the curing of the tobacco leaf. While the field collector gathers every kind of plant for his herbarium, under all sorts of seasonal, climatic, and habitat conditions, a study of the best curing conditions of tobacco may throw some light on what happens as herbarium plants are dried or cured slowly or rapidly.

The curing of the various types of tobacco is not a haphazard process but is very carefully conducted from beginning to end. It is recognized that it is a life process, allowing certain changes to occur in the living protoplasm of the plant. The changes taking place are

very largely changes in chemical composition of various constituents in the leaves, stems and flowers, and these changes are apparently like those which take place in the undisturbed living plant. The conversion of starch into reducing sugars, and the further breakdown of these into CO_2 and H_2O, through a train of enzymatic activities is well known and very important in tobacco curing. It is probably present and quite as important in some respects in the curing of herbarium material. The presence of the hygroscopic reducing sugars is definitely known to favor the conditioning of flue-cured tobacco. Various salts of organic acids, more especially the potash salts, are known to be very hygroscopic, and these are more or less abundant in most if not all plant material as well as tobacco. Various other factors unquestionably influence the course and final results of the various chemical changes taking place in hastened and in slow drying.

In the curing of tobacco, whether it is the flue-cured type, the Maryland air-cured cigarette type or the cigar air-cured type, it is recognized that the rate of drying is a very important condition. Artificial heat is used only in the flue-curing districts to hasten curing. Flue-curing usually dries the leaves brittle-dry in from 4 to 5 days. Maryland cigarette tobacco and the cigar filler, binder and wrapper types, dried at air temperature, alone, may require 5 to 8 weeks or more depending upon prevailing weather conditions.

Air drying is a slow method, and flue-curing is a relatively rapid method. A ripe tobacco leaf may be very rich in starch, in some instances even making up 15-25 per cent of its weight on a dry basis. Even the green leaf, when fully ripe, may be so packed with starch, as shown by its yellowish color and thickness, that it will break readily when creased.

In the quick flue-curing process, the percentage composition of starch for the entire cured leaf may be several per cent, whereas the whole leaf of Connecticut Broadleaf, when slowly air-cured, shows no remaining starch. In the former method, the entire leaf may show 9-10 per cent or even 15-25 per cent reducing sugars in some instances, while the air-cured Connecticut Broadleaf will show less than 0.3 per cent. The exceptionally high content of reducing sugars in the flue-cured tobacco apparently explains the marked hygroscopic character of the leaf of this type as compared with the air-cured types. Even after being thoroughly cured and dry, it is known that the flue-cured leaf will come in order overnight provided good humidity conditions prevail.

Thus tobacco, under normal air conditions may remain more or less soft and pliable, or in good order, whereas others more slowly cured come into order much more slowly and require higher air humidities. It stands to reason that a moist leaf or one with a much higher moisture content than another, will be more susceptible of handling without breaking than a dry, rigid leaf. The presence of the sugars alone will favor this condition to a marked degree due to their hygroscopicity.

All green plants form starches and sugars, and the conversion of the starches and related products depends upon enzymatic activity. The conversion of the starch is dependent upon various conditions of temperature and humidity and requires a certain optimum period of time to be accomplished. If the leaf is suddenly killed by fumes of chloroform or high temperature conditions, so that drying is very rapid, there will be little or no conversion to reducing sugars. Such leaves will remain very brittle, and be slow to come into condition even when higher air humidities are experienced. It is well known that tobacco will "hay down" or cure green in the sun, or in the curing barn where flue-curing temperatures are too high and drying is too rapid. The grower well knows that he must watch his flue-curing process very carefully, and begin it rather gradually. If in the curing process, a noticeable curling of the thinner edges of the leaves is noted while still green, he is inviting trouble and knows that he will secure a poor product – poor in color from too rapid killing, with a resultant lack of quality, body, elasticity and other desired characteristics. He realizes that he must at once reduce the temperatures in his curing barns.

The drying of herbarium specimens is unquestionably a sort of moderate curing process until the plant tissues are dry. As in tobacco intended for commercial purposes, one may air-dry slowly, or heat-dry by lamps or other methods of applying heat. It is true that one can dry plants very rapidly, even within a few hours or a day by the proper technique and ventilation with corrugated cardboard. This may seem to save much time and labor, but it is doubtful if it gains much in the long run. If the killing and drying is too rapid the starches when present are not converted into sugars but remain as such in the leaves. The plant tissues "hay down" very rapidly, and have little facility for hygroscopicity such as properly flue-cured tobacco shows. This, it seems to me, should be an important con-

sideration, since herbarium material usually experiences normal room temperatures and humidity.

Many years ago I myself devised a rapid laboratory drier equipped with heaters at the bottom and with a suction flue to pull the air from the room into and through the oven at regulated speeds. At first I felt quite elated but I soon ran into trouble. In the beginning the plants tended to cook and blacken, then when excessive heating was overcome, they still dried too rapidly and became very brittle and consequently unsatisfactory. I have abandoned entirely this method of quick artificial drying and never place the plants and press in this heated drying box. I now use it only to dry the blotters (driers) just as I frequently dry these in the sun in the field on clear days, then place them while warm over the sheets and plants in the press outside.

I change these blotters frequently, often twice a day, and even then this method usually requires five days to a week before I consider many of the plants sufficiently dried. My usual procedure is to place the green plant material in the folded newspapers in the press, leaving them here until night or even until the next morning before placing the papers between blotters. The following morning I rearrange the leaves and stems if need be, and replace the moist driers (blotters) with cool or very slightly warmed dry ones. I may change these late in the afternoon or the next morning, when the plants show indications of some firmness and dryness. I prefer to use the dry blotters very warm, either heated in the sun or warmed by artificial heat. The entire process as stated usually requires 5 to 6 days. I have prepared nearly 13,000 numbers, or from 40,000 to 50,000 specimens by this method. These have gone out to many herbaria, and appear to have proven satisfactory; at least I have heard no particular complaints up to the present time.

It is of interest that the usual drying method which I have adopted requires about as much time (5 to 6 days) as is required to dry a barn of tobacco leaf by the flue-curing method for the best results. I have no figures on the presence of starches or the hygroscopic reducing sugars in the herbarium material, but it is probable that since the two time periods are equal in duration during the curing process, and a high content of reducing or invert sugars is known to be present and desirable in the flue-cured tobacco leaf, it may be assumed that some of these sugars are present in the "cured" herbarium material. This alone would favor greater hygroscopic

tendencies in ordinary room air, and tend to keep the material more pliable and consequently less brittle and breakable. While glucose is only slightly hygroscopic, taking up only .07 per cent moisture at 70 per cent humidity, fructose is extremely hygroscopic, taking up 20 per cent moisture at about the same humidity.

The water absorptive capacity of dried tobacco leaves is also in part dependent upon the potash compounds in the leaf. It has been shown that where insufficient supplies of potash are present in the soil or fertilizer, the cured leaf does not come readily "into case" or order, and become soft. While potassium sulphate and phosphate may occur in the leaf in small quantities, much of the potassium is combined with organic acids, chiefly malic acid in tobacco, although small quantities are combined with citric, fumaric, succinic and oxalic acids, all of which salts are more or less hygroscopic. Of course wild plants for the herbarium must be taken anywhere and everywhere, and the chemical composition of wild plant material can be of little significance to the field botanist. However, since salts are more generously taken up when abundant in the soil, such hygroscopic salts as the chlorides would be especially significant in seashore and strand material. Slow or rapid drying will not change the potassium, calcium, sodium or magnesium content of a plant however.

If plants were composed only of pure cellulose of fine fibrous structure like a cotton handkerchief, brittleness associated with curing methods would be of no concern. Plant material is not of this nature, but is cellular, with great variations in cell structure, thickness, protoplasmic composition, and is immensely varied in its chemical constituents. Too rapid drying, and killing with high temperatures may not always be the best procedure, and perhaps is never so desirable as moderately slow methods which allow starches to transform into the hygroscopic reducing sugars, as in the case of the flue-cured tobaccos, without undergoing further reduction and loss as in the air-cured tobaccos.

Such material owing to its greater hygroscopicity under ordinary room temperature conditions is surely less likely to be unduly brittle and breakable with the usual handling. Owing to the greater dryness of the heated air in winter, herbarium material probably is more susceptible to breaking by handling at that season than in the humid atmosphere of summer. It may be found desirable some day to air-condition herbaria properly for the best results in preventing undue damage to the plant material. Low temperatures as well as

dry air are unfavorable to dried plant material subjected to handling. In low temperatures even viscous materials become less mobile; candy in warm temperature may bend, but in the cold will break readily. Cold air not only has less capacity for moisture but when artificially heated in wintertime by our modern methods may become much drier than the normal air of the summertime. At lower temperatures even the most viscous constituent will harden more or less even when the same moisture conditions prevail. Under winter conditions plants in our warm herbaria would tend to be more brittle than in summertime.

One may conclude that the drying of plant material for the herbarium is essentially a life process as it is in the curing of tobacco. Certain physical and chemical changes take place in the leaf so long as the protoplasm remains alive. If the protoplasm is killed suddenly by scalding, by very high drying temperatures, or by treatment of the green plant with chloroform, formaldehyde or other protoplasmic poisons, all the life processes cease, and the material never again cures. Drying of plant material, as in the curing of tobacco, is a curing process, and the chemical changes which take place as the protoplasm dies or cures depend upon the rate of drying. The results of the slower drying are qute unlike the results attending rapid or excessive heat drying. Plant material killed by protoplasmic poisons or scalding and then dried remains very brittle and breakable, whereas more slowly dried material seems to be generally in better condition for handling as in the case of the best flue-cured tobaccos. Too rapidly dried material tends to approach the condition shown by that where the protoplasm has been suddenly killed by lethal fumes, etc. If heat is used it should be used with considerable caution. The proper curing of flue-cured tobacco and its effects on the breakdown of the starches and other products, favorable to greater hygroscopicity due to the presence of the hygroscopic reducing sugars and other constituents, afford a rather significant lesson in our drying of herbarium material.

WASHINGTON, D. C.

The Genus Botrychium in West Virginia*

ELIZABETH ANN BARTHOLOMEW

The distribution of the species of *Botrychium* in West Virginia has been studied carefully by numerous investigators, but some published records need correction, and it was felt desirable to review the known distribution in the State at this time, in connection with the forthcoming publication of the *Vascular Flora of West Virginia*, by P. D. Strausbaugh and Earl L. Core.

1. BOTRYCHIUM MATRICARIAEFOLIUM A. Br. HAMPSHIRE: Capon Springs, *F. W. Hunnewell, 18,007*, June 7, 1944. PRESTON: Terra Alta Lake, *W. C. Legg*, June 18, 1943; 1 mile north of Terra Alta, *M. G. Brooks*, July 30, 1943.—The Preston County specimens were reported in the literature (Amer. Fern Jour. 33:140, 141. 1943) as *B. simplex*, but the specimens have recently been determined by Edgar T. Wherry to be instead the simply-pinnate form of the present species.

2. BOTRYCHIUM SIMPLEX E. Hitchcock. UPSHUR: near Selbyville, *Robert M. Tetrick, II*, July 30, 1947; Selbyville, July 26, 1847.—As noted above, *B. simplex* was reported in the literature from Preston County but the records appear to have been based upon mistaken identifications. Thus the Upshur County collection (reported in Amer. Fern Jour. 38:93. 1948) is the only known record in the State, although the inconspicuous habit of the plant has doubtless caused it to be overlooked.

3. BOTRYCHIUM DISSECTUM Spreng. BARBOUR: near Philippi, *Fred W. Gray*, November 1933; CALHOUN: Sycamore, *Ray Harris*, June 23, 1933; Brookville, *Ray Harris*, July 1, 1933; FAYETTE: (no location given), *L. W. Nuttall* 925; HARRISON: Shinnston, *Robert F. Martin* 219; JEFFERSON: Bloomery, *Wilbert M. Frye*, Oct. 7, 1912; OHIO: Oglebay Park, *Mr. & Mrs. Earl Smith*, Aug. 9, 1942; POCAHONTAS: Cranberry Mt., *E. Meade McNeill*, Aug. 8 ,1931; MERCER: swamp near Athens, *W. V. U. Bot. Exped.*, Aug. 4, 1927; MONONGALIA: Morgantown, *A. L. Post*, Oct. 16, 1904; POCAHONTAS: Droop Mountain, *Kitty Speicher*, July 26, 1928; PRESTON: Three Forks Creek, *Mr. & Mrs. H. A. Davis*, Sept. 24, 1938; Amboy, *E. L. Core* and *H. A. Davis*, Sept. 20, 1938; RANDOLPH: Sinks of Gandy, *Maurice Brooks*, Sept. 7, 1939; UPSHUR: Hackers Creek, *Robert Tetrick, II*, Aug. 19, 1947; WAYNE: Hammond Hollow, *Isabelle Lycan*, Sept. 5, 1931; WETZEL: 2 mi. east of Littleton, *Oscar Haught*, 883, Aug. 25, 1931; WIRT: 2

*Contribution No. 60 from the Herbarium of West Virginia University.

miles above Palestine, *Elizabeth Ann Bartholomew*, W1819, Sept. 8, 1947.

Forma OBLIQUUM (Muhl.) Fernald. BARBOUR: Philippi, *Fred W. Gray*, Nov. 1933; CABELL: near Lesage, *Maurice Brooks* and *A. S. Margolin*, May 1, 1937; near Milton, *Louis Williams* 350, Oct. 6, 1935; CALHOUN: Pink, *Ray Harris*, 207, Oct. 20, 1932; Hur, *Ray Harris*, July 22, 1933; FAYETTE: Nuttallburg, *L. W. Nuttall*, Sept. 13, 1891; GREENBRIER: north of Alderson, *Sterling Hanger*, Oct. 3, 1939; mouth of Second Creek, *W. V. U. Bot. Exped.*, Aug. 5, 1926; HANCOCK: 2 mi. south of Chester, *J. L. Cartledge* and *Dick Smith*, Oct. 13, 1945; MERCER: 4-H Grounds near Athens, *W. V. U. Bot. Exped.*, Aug. 4, 1927; *E. Meade McNeill*, July 29, 1930; MONONGALIA: Morgantown, *A. L. Post*, Oct. 16, 1904; OHIO: Oglebay Park, *George Flower* 49, Aug. 25, 1935; *Earl E. Smith*, Aug. 9, 1942; POCAHONTAS: Droop Mountain, *Kitty Speicher*, July 26, 1928; PRESTON: Reedsville, *Maurice Brooks*, Oct. 16, 1935; RALEIGH: Staniford, *John Paul Tosh* 720, Sept. 24, 1940; RANDOLPH: Helvetia, *Earl L. Core*, Aug. 29, 1938; UPSHUR: Sago, *Edward C. & Edward R. Grose*, Aug. 8, 1946; Hackers Creek, *Robert Tetrick, II*, Aug. 13, 1946; WAYNE: 1 mi. north of Ft. Gay, *Isabelle Lycan*, Sept. 5, 1931; WEBSTER: Stroud's Creek, *Mr. & Mrs. H. A. Davis*, Sept. 1, 1937; WETZEL: 1½ mi. east of Littleton, *Oscar Haught*, 814, Aug. 17, 1931; WIRT: ½ mi. above mouth of Reedy Creek, *Elizabeth Ann Bartholomew* W-325, Sept. 1935; 1 mi. up Little Kanawha River from Palestine, *Elizabeth Ann Bartholomew*, W-1671, May 17, 1947.

Forma ONEIDENSE (Gilbert) Waters. PENDLETON: near Gatewood Switch, *Maurice Brooks*, Sept. 7, 1939.

Forma **confusum** (Wherry) Bartholomew, **comb. nov.** (*B. obliquum* Muhl., f. *confusum* Wherry, Bartonia 21:12. 1942). HAMPSHIRE: Hanging Rock, *Wilbert Frye*, April 10, 1933; LINCOLN: near West Hamlin, *Maxine Thacker*, May, 1940; PUTNAM: near Hurricane, *M. G. Brooks* and *A.S. Margolin*, May 1, 1937.

4. BOTRYCHIUM LANCEOLATUM (Gmel.) Angstroem var. ANGUSTISEGMENTUM Pease & Moore. PRESTON: 1 mile north of Terra Alta, *M. G. Brooks*, July 30, 1943; POCAHONTAS: Greenbank Glades, *P. D. Strausbaugh*, June 29, 1933; UPSHUR: near Selbyville Youth Camp, *Robert M. Tetrick, II*. July 26, 1948 (See Amer. Fern Jour. 38:93. 1948).

5. BOTRYCHIUM VIRGINIANUM (L.) Sw. BARBOUR: 12 mi. s. of Grafton, *Agnes Hardin Halier*, June 24, 1951; CABELL: near Union

Church, Milton, *Louis Williams 458*, May 23, 1936; CALHOUN: Arnoldsburg, *Earl L. Core*, June 23, 1932; Pink, *Ray Harris*, May 13, 1933; Brooksville, *Ray Harris*, June 3, 1933; FAYETTE: *L. W. Nuttall* 12, May 29, 1892; near Glendale, *Maurice Brooks* and *A. S. Margolin*, April 29, 1937; GILMER: Glenville, *E. R. Grose*, May 26, 1935; GRANT: Bayard, *C. F. Millspaugh* 927, July 9, 1891; Greenland Gap, *Earl L. Core*, July 1937; GREENBRIER: Muddy Creek Mountain, *Sterling Hanger*, Oct. 4, 1939; Kate's Mountain, *William B. Fox*, July 1, 1940; 4 miles west of Organ Cave, *Cora M. Burdette*, May 29, 1943; HAMPSHIRE: Hanging Rock, *Wilbert Frye* 308, June 17, 1932; July 8, 1936; High View, *Earl L. Core*, May 28, 1939; HARRISON: Shinnston, *Robert F. Martin* 198, July 28, 1933; near Clarksburg, *W. J. Judy*, Summer, 1934; JEFFERSON: Shepherdstown, *H. Ison Shreve*, August, 1940; KANAWHA: Clendenin, *Cecil Strickland*, May 26, 1933; Gilligans Hill, *Leslie Greenlee*, May 30, 1934; Watts Hill, Charleston, *Leslie Greenlee*, Aug. 13, 1934; LINCOLN: near West Hamlin, *Maxine Thacker*, May, 1940; MARION: Old Grafton road, *Jo Martin*, July 17, 1929; Old Grafton road, *Roy Dillaman*, July 17, 1929; Winfield, *L. Carl Cornell*, May 24, 1938; MARSHALL: 2 mi. w. of Bellton, *Earl L. Core*, 5324, July 6, 1937; MINERAL: New Creek, *Charles Chapman*, June 6, 1933; MINGO: Kermit, *Ray Harris*, June 3, 1933; MONONGALIA: Dent's Run, *R. C. Spangler*, June 26, 1924; Core, *Elizabeth Ann Bartholomew* and *Clara Ruth Core*, October 8, 1938; NICHOLAS: near Craigsville, *William D. Creasy*, July, 1946; OHIO: Oglebay Park, *Russell West*, Sept. 4, 1937; POCAHONTAS: *Fred W. Gray*, 1927; Greenbank, *Kathryn Speicher*, July 30, 1928; Upper Switch Back, Cass, *Kathryn Speicher*; August 1, 1928, Elk Mt., *Kathryn Speicher*, July 25, 1928; Millpoint, *Russell West*, July 31, 1937; PRESTON: Masontown, *P. J. Zucchero*, July 3, 1931; RALEIGH: Shady Spring School, *John Paul Tosh*, June 10, 1940; RANDOLPH: Elkins, *N. Bayard Green*, June 23, 1928; Huttonsville, *Eugene E. Hutton*, Sept. 1, 1938; SUMMERS: Barger's Springs, *William B. Fox*, June 8, 1939; TYLER: Sistersville, *Isabelle Lycan*, June 23, 1931; UPSHUR: Sago, *Edward C. Grose*, July 5, 1946; Hacker's Creek, *Robert Tetrick, II*, May 15, 1947; WAYNE: 1 mi. n. of Ft. Gay, *Isabelle Lycan*, September 5, 1931; WETZEL: north of Littleton, *Oscar Haught*, 356, June 10, 1931; WIRT: near Owensport, *Elizabeth Ann Bartholomew*, June 11, 1932.

WEST VIRGINIA UNIVERSITY,
MORGANTOWN

Danske Dandridge*

EARL L. CORE

Just before the turn of the century, the name of Danske Dandridge was making West Virginia known botanically upon both sides of the Atlantic. Like many another, however, she was "not without honor save in her own country and among her own people." It is in belated recognition of her work that the present sketch was prepared by one of "her own people."

Caroline Dane Bedinger was born in Copenhagen in 1854, while her father, Henry Bedinger, was minister to the Court of Denmark. "Danske" was her father's pet name for her.

Mr. Bedinger came home in 1859 to join his wife and children, who had preceded him to Shepherdstown, Va. (now West Virginia). His many friends gave him a barbecue at Harper's Ferry to express their pleasure at his return, but he caught pneumonia on the horseback ride home and died shortly afterwards.

Little Danske was the youngest of three talented children. Like the Bronte children, they took to literature from the cradle. Every scrap of paper that came into their possession was saved for their "books." At the age of 11 Danske dedicated a volume of poetry to the Hon. Alexander R. Boteler. The 70 journals and note books she left testify to a life of labor.

Her older sister, Mary, was also a gifted poet and her reminiscenses of the Civil War were published from time to time in the Century Magazine under the pen name of Mariah Blunt.

Danske was married to Adam Stephen Dandridge in 1877 and following her marriage she wrote and published several volumes of poetry. During this period she also began the serious study of botany, and, desirous of knowing the trees and shrubs of West Virginia, she began planting them in a large grove surrounding Rose Brake, her country home near Shepherdstown.

When she sold a poem to a magazine, she would spend the proceeds beautifying Rose Brake, and she presently came to have 500 different kinds of trees and shrubs in the grove, as well as a great many different kinds of herbaceous plants, which she knew and wrote about in various horticultural magazines in this country and England. She had plant-loving friends in many countries, who sent seeds and plants for her estate. She had 60 kinds of spireas.

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*Contribution No. 61 from the Herbarium of West Virginia University.

Miss Gertrude Jekyll, editor of the English magazine, *The Garden*, was a personal friend and published many of her articles under the heading, "Letters from Rose Brake". The magazine *Forest and Stream* published another series called "Notes from West Virginia". Various other series were also published, including "My Garden from Day to Day," and "The Hammock under the Oaks". Other magazines publishing her articles included *Garden and Forest*, *Park and Cemetery*, and *Gardening*. She kept copies of the published articles cut from magazines in a large note book, which is still kept at Rose Brake.

While always interested in trees, shrubs and flowers, she wrote history in her later years. Among her historical books are "Historic Shepherdstown", "George Michael Bedinger, A Kentucky Pioneer", "American Prisoners of the Revolution", and "St. Clair's Defeat".

She was a correspondent of various horticulturists of the day and Elliot's Nurseries named a Phlox, with a deep red cross in the center, the "Danske Dandridge" Phlox.

A partial list of articles published in *Garden and Forest* during one year follows:

1. The Shrubbery. November 25, 1891
2. An Evergreen Shrubbery. January 13, 1892
3. Spring in West Virginia. March 2, 1892
4. *Phajus grandifolius* in a window-garden. April 20, 1892
5. Early May in West Virginia. May 18, 1892
6. Mid-May in West Virginia. June 1, 1892
7. May in West Virginia. June 8, 1892
8. The Time of Roses. June 11, 1892
9. Mid-June in West Virginia. May 22, 1892
10. Late June in the Garden. July 6, 1892
11. Some interesting Plants. July 13, 1892
12. In the Company of Trees. July 20, 1892
13. A Bed of Hardy Annuals. July 27, 1892
14. Hard Times in West Virginia. November 2, 1892
15. Mid-October in West Virginia. November 9, 1892
16. Notes from West Virginia. November 16, 1892

Her style is characterized by a classic simplicity and at times reads like prose poetry. Her writings form an important portion of the botanical literature of West Virginia. A sample is provided in the reprinted article, "Spring in West Virginia", which follows. The entire set of articles seems worthy of being reprinted in book form.

Mrs. Dandridge died in 1914.

In the preparation of this article I am deeply indebted to Mrs. Dandridge's daughter, Miss Serena K. Dandridge, who still resides at Rose Brake and is always happy to show to interested people such of her mother's plantings as have survived to the present time.

West Virginia University

SPRING IN WEST VIRGINIA*

Danske Dandridge

The advance-guard of spring reaches West Virginia early in February, and we celebrate its arrival with a feast of Water Cresses, which are as grateful to snow-wearied eyes as to the palate. In late March a tour around the garden shows many signs of promise. The birds know very well that spring is coming, for in February the cardinal grosbeak whistles boldly on every frost-free morning, and the blue bird takes you into his confidence in his quiet fashion to say that the season of flowers is really at hand. The shrubberies on this 19th day of February are full of swelling buds, and even some insect life is discoverable here and there, and spider threads are seen thrown from one limb to another. Very striking is a low clump of Honey Locusts, the deep red spines of which make an effective contrast to the striped bark of the branches, a light gray on olive green and very smooth and satiny in texture. These curious waves and markings are confined to the young growth, and are conspicuous now. Later on, in the exquisite delicacy of its foliage, the red leaflets matching the thorns in color, it will rival any of the greenhouse Acacias. The Hypericums are already leafing out, and H. aureum is fairly covered with its stifflinear leaflets, dark green with red and orange tints on the latest comers.

Wall-flowers are in bud, bulbs are peeping through the ground, some of the early Hyacinths which stand in a sheltered nook are already well advanced. Spiraea prunifolia shows many tiny leaves, while S. Thunbergii is covered with knobby flower-buds, as are some of the Cydonias, while others show a few blood-red leaves just starting, and they are almost as pretty as the blossoms. Caragana altagana shows a green rosette here and there, and is only waiting for two or

*Reprinted from **Garden and Forest,** March 2, 1892.

three warm, sunny days to open more of its curious leaf-buds, which look like little blotches of green paint scattered over the branchlets. Among the flowers, Crocuses are following the Snowdrops, and Chionodoxas are hard after them, with the earliest Jonquils, Daffodils, Violets and the lesser Periwinkle almost in sight. These modest blossoms are the ones which the flower-lover prizes above any of the later, more gorgeous, blooms which the lavish month of May brings with it.

It is a good plan to have a space in the shrubberies devoted to the March bloomers, some of which are found in very few gardens. There is a very early-blooming Rhododendron, R. dauricum, that is not planted half as often as it should be. Daphne Mezereum shows with us the first rosy bloom of the year; the predominating color for early spring flowers seems to be yellow, purple and white. Daphne Genkwa is a charming plant of slow growth and fragrant violet-colored flowers, and probably the sweetest shrub that blooms in March. Then there is the Leather-wood (Dirca palustris), which grows wild in our woods, displaying small yellow bunches of flowers about the time that the Marsh Marigolds brighten the forest pools with their gold. This shrub is offered by some nurserymen, and it is of easy cultivation away from its native habitat. Jasminum nudiflorum is a graceful shrub of early bloom, and cheerful in spite of its weeping habit. It is deservedly a favorite with designers of parks, and is much used about the public buildings of Washington, where it celebrates Easter Sunday after a sunny fashion peculiar to itself. Prunus spinosa and Prunus Pissadri bloom here late in March and are rather earlier than the Forsythias.

In the wild garden the Bloodroot, Saxifrage and Twin Leaf will bloom as the earliest Fern-fronds are unfolding, and they are quickly followed by Hepaticas, in their woolly overcoats, the first Anemones and fragrant Epigaea, which some people are able to coax into forgetting its native haunts and blooming in civilized gardens. On the very first of February, which was a genial day, we found reddish brown barren catkins two inches long, and tiny unopened pistillate flowers on our Japanese Alder, and these gave us as keen pleasure as the bloom of a favorite Rose-tree in June. These catkins are far in advance of all of our other trees. Scarlet Maples, Aspens, Willows and Hazels are growing more interesting as the days lengthen, but to this Alder belongs the glory of being the first tree to bloom in spring.

Every day we watch the earliest bloomers among the shrubs for signs of growth. Xanthoceras sorbifolium, which the youngest member of the family *will* call rhinoceros, receives much attention. It has not bloomed yet, being, indeed, only eighteen inches high, and it is not likely that it will gratify our curiosity for another year, but it is said to produce blossoms when very small. Chimonanthus fragrans is also of much interest, as it has never been seen in bloom here. The red-branched Cornels, the yellow-stemmed Forsythias, the green twigs of Scotch Broom and the Japanese Corchorus are also attractive, and the bark grows brighter on them as the buds begin to swell. Lonicera sempervirens was the first of all our plants to show the tender green of its spring foliage.

Rose Brake,
Shepherdstown, W. Va.

NOTES and NEWS

Warren R. Witz (obituary).—Dr. Warren R (ay) Witz, Associate Professor in the Department of Biological Sciences of the University of Pittsburgh, died November 11, 1951, of heart disease. Born March 17, 1896 at Warren, Pennsylvania, he attended schools in Warren, and graduated from Thiel College in 1922. While teaching in high school at Erie he took work at the summer session of the Lake Laboratory of the University of Pittsburgh at Erie, Pa., and received the M.S. degree (Pittsburgh) in 1929, his thesis having been on the aquatic vegetation of Presque Isle and Erie Bay. In 1928 he became an instructor, carrying on his summer work at the Lake Laboratory under the direction of the writer, and investigating the relationship of *Geaster* to *Arctostaphylos*. It had previously been noted that the patches of *Arctostaphylos* on the sand-dunes of Presque Isle were frequently encircled to a certain degree by the *Geaster*. Mr. Witz demonstrated a definite mycorrhizal relationship between the two plants and made this the basis of his Ph.D. thesis, receiving this degree from the University of Pittsburgh in 1933.

Dr. Witz served as Director of the Lake Laboratory from 1947 to 1949, at which time the summer laboratory work was transferred

to the Pymatuning station at Linesville. His main activities at the University of Pittsburgh were concerned with the introductory courses in botany and later with general biology when the departments of botany and zoology were combined. He was the author of the laboratory manual used in the first year biology, and later took charge of the course in field botany and general nature study, in which latter course he very successfully emphasized the importance of field work. Conscientious, dependable, and helpful to the highest degree, he will be sorely missed by both his students and fellow faculty members.

Married in 1924, he is survived by his wife and married daughter, four sisters and two brothers. He was buried at Leetonia, Ohio.—O. E. Jennings, University of Pittsburgh.

Azolla caroliniana in Maryland—In the fall of 1951, while the author was reviewing the 'Ferns and Fern-Allies of Maryland, Delaware and the District of Columbia' with Dr. R. G. Brown of the University of Maryland, he reminded him of a collection of *Azolla caroliniana*, which was brought in to him a couple years ago by Col. F. S. Blue, of Buckeystown, Frederick County, Maryland. This plant had never been recorded from Maryland and no specimens were available in any herbarium. To make sure of the authenticity of the find, a trip to the locality was necessary.

The following week-end found my wife and myself on the way to Buckeystown, a small town about six miles south of Frederick, in the south-central portion of Frederick County, an area predominately overlain with limestone. After chasing down several 'Kentucky' colonels (as all the information I had was that a colonel from Buckeystown had brought in a jar full of *Azolla* a couple years ago from his water cress pond and since everyone with a farm around Buckeystown seems to have the title of a colonel), my final search was directed up a stone road, leading westward from the main north-south highway (#15) out of Buckeystown, past a picket fence and a long line of trees to the remnants of a yesteryear, the home of the wife of Charles Carroll of Carollton. At the present time only the chimney and a few bricks (brought from England) and a huge Osage Orange tree in front remain. To one side was an underground fruit cellar, slightly repaired at the entrance and with electricity and a water pump, into which Mrs. Blue eventually led us — the amazing phenomenon being that the entire curved ceiling was made of flat

limestone rocks wedged together and without mortar, except for the red clay which is often found overlying the limestone deposits in this area. A beautiful piece of architecture! Supposedly built by the Indians, perhaps by slaves!

The old coach house to the right of the ruins of the house proper has now been remodeled and constitutes the main living quarters for the Colonel and his family, except in winter, when it's too cold. Upon arrival, my wife and I were immediately greeted by the Colonel. Upon inquiry as to the whereabouts of the little plant he had brought to Dr. Brown several years ago, Col. Blue pointed over a rocky limestone ledge just off the road to a large flat, about eighty feet wide, covered with water cress, with a two or three foot water-way down the center. At the head of the water-way the water was flowing out from under the rocky limestone ledge. The water was cold and clear, well in the shade of poplars, with an occasional Marginal Shield Fern or an Ebony Spleenwort on the rocks. A Striped Water Snake led the way around the path over to the outlet of the water from underground, then vanished under some leaves and rocks.

Along this water-way about 100 feet beyond the rocky ledge *Azolla caroliniana* could be seen, forming bronze and blue-green patches in the more quiet areas among the cress. Two or three years ago *Azolla* had become so thick in the Water Cress Bed that Col. Blue had brought in this weed to the University of Maryland to find out what he could do to get rid of it. (Col. Blue cuts over his cress bed several times a year and markets it in Washington, D. C.). A copper salt was suggested, but it went hard for the cress as well as the *Azolla* and the duckweed. This year has been the first in two years that the cress bed has done well, but both the *Azolla* and the duckweed are back also. Needless to say, we collected plenty of *Azolla caroliniana*.

Since the limestone crops out in the entire area around Buckeystown, eastward to the Monocacy River and southward through Frederick County, a search in other cress patches along the western drainage of the Monocacy brought to light several other finds of *Azolla caroliniana* in wet patches, in open meadows and around ponds.

Collected specimens: *Frederick County*: In water cress bed, fed by springs draining from limestone ledges, just west of Buckeyestown. Sept. 22, 1951. *Reed 27213;* along edge of stream, in ponds and in meadows, Three Springs Hatcheries, 3 miles south of Buckeystown. Sept. 22, 1951. *Reed 27212.*—Clyde F. Reed, Reed Herbarium, Baltimore, Maryland.

CAREX PAUCIFLORA IN WEST VIRGINIA.—On July 18, 1951, while exploring for plants on the high plains just north of Dolly Sods in Grant County, I found *Carex pauciflora* Lightf. growing in abundance in an acid peat and spagnum moss bog constituting a species hitherto not recorded in the West Virginia flora.

This small and distinctive *Carex* has a far northern distribution, ranging from Labrador to southern Alaska, south to Newfoundland, Nova Scotia, northern and western New England into northern Pennsylvania, Wisconsin, Minnesota, and Washington.

It evidently finds the cold bog near Dolly Sods, at an elevation of about 4,000 feet, quite to its liking. One of the distinctive features of this species is the bladeless lowermost culms.

Companion plants growing with this in abundance were *Drosera rotundifolia, Gentiana linearis, Carex aestivalis, Rhynchospora alba* and *Zigadenus leimanthoides. Drosera rotundifolia* and *Zigadenus leimanthoides* were in full bloom, and both very abundant. At the time of finding of *Carex pauciflora,* July 18, the strongly reflexed perigynia were beginning to fall.

Material is being deposited in the U. S. Herbarium, Washington, D. C., and in the herbarium of West Virginia University under my collection number 19963.—H. A. ALLARD, ARLINGTON, VA.

BOOK REVIEWS

ALGAE OF THE WESTERN GREAT LAKES AREA.*—The author describes this as being a handbook for those interested in the taxonomy, distribution and ecological relationships of the algae of the Western Great Lakes Area which are of strictly aquatic habitats. Desmids and diatoms are excluded. The shore and moist soil floras are almost excluded.

Readers need a background of botany in order to make the best use of the book, however, it is not necessary to be an Algologist. It is very clearly written, easily understood and enjoyable to use. The author gives good definition of terms as well as symbols and abbrevia-

*Algae of the Western Great Lakes Area. G. W. Prescott, Cranbrook Institute of Science, Bulletin No. 30. Bloomfield Hills, Michigan. 1951. 946 pp. $10.50.

tions used. There are numerous charts and figures which condense the data on distribution of algae, type of lakes, ecological factors, etc., with which comparisons can readily be made. Several pages are devoted to illustrating morphological terms used. Plates of figures of the algae described are included in one section at the back of the book. A good glossary is included, as well as a rather complete bibliography.

The biggest part of the book is naturally devoted to a systematic study of the algae, of which he describes some 1100 species. The rest of the book is on algal distribution and limnology. It should have wide usage.

The area studied by this author (Michigan and Wisconsin) is particularly good for algae as about 1137 square miles of Michigan and 1620 square miles of Wisconsin are covered by water. Not all bodies of water have an equal abundance of species or numbers of algae as, for example, most of the lakes of the eastern half of the northern Peninsula of Michigan are poor in both numbers and species.

The author points out that some aquatic species may have a wider geographical distribution than some terrestrial forms due to a more constant environment. He feels that this idea of universal distribution is sometimes somewhat over emphasized. As for algae, it is practically impossible to "type" a lake because each lake in its final analysis possesses a distinct individuality, although, of course lakes can be classified according to certain characteristics which are of known biological significance. Most of these lakes are glacial in origin but since conditions have not been uniform there are some general differences to be noted. Readers are referred elsewhere for detailed studies of surface features and geology of Michigan and Wisconsin. The author does relate the flora of the lake to the surface features and geology in separate discussions of soil types and algal distribution of Wisconsin and Michigan. In his discussion of the different regions of the states, he gives a general description of soil types, underlying strata, pH and the distribution of algae in the various bodies of water.

In Michigan the physiography is varied and complicated by the upper and lower Peninsulas. The upper Peninsula has two areas which are determined by the underlying rock formations and soil types and there are five regions in the lower Peninsula. In the Northern Peninsula there are the Western, or highlands, and the Eastern, or lowlands, regions. In the Southern Peninsula there are

the Northern Upland, Michigan Lowland, Saginal Lowlands, Thumb Upland and the Erie Lowlands.

In Wisconsin there are four regions, which of course in general show a corresponding difference in lake types and algal flora. There are the glaciated limestone, unglaciated limestone and the third and fourth types (not so well definde) which constitute in general the upper third of the state and are basically a crystalline rock area with sandy and glaciated granite soils.

The lakes are divided into six types, 1. hard water drainage lakes, stream or spring-fed, with an outlet at least during part of the year; 2. hard water seepage lakes (rare) high in calcium, magnesium, and half-bound carbon dioxide, landlocked; 3. soft water drainage lakes (uncommon in Wisconsin and Michigan), low in calcium and half-bound carbon dioxide, with inlet and outlet; 4. soft water seepage lakes (common, particularly in northern parts of the area, of Michigan and in upper Wisconsin), low in calcium, magnesium and half-bound carbon dioxide, fed by seepage or drainage from bogs, without outlet; 5. acid bog lakes, mostly seepage, low in calcium; 6. alkaline bog lakes, mostly drainage, relatively high in calcium. These lake types in general are determined by geological history.

A number of the hard water drainage lakes are described and the drainage system in which they are located is given. It appears that the drainage lakes in the southern parts of the two states are mostly harder than in the northern parts. He notes that in the highland region this type of lake may be as poor a producer as some of the soft water lakes when it has a sandy bottom and little shallow water. For this type of lake he describes the abundant flora and nutrients as nitrates and phosphorus. The hard water seepage lakes are not often found in this region, most seepage lakes are soft. The characteristics of these are given in table form.

Soft water drainage lakes are few in number compared to soft water seepage lakes. As he shows in his tables, the limnological and biological characters are much the same for both these types of lakes. The soft water draniage lakes have a greater available total-nitrogen content than hard water or soft water seepage lakes. The amount of nitrogen of course fluctuates with the amount of phytoplankton present. He points out that, in some instances at least, the reason for the characteristic shortage of nutrients in seepage lakes is that the water percolates through sand and crystalling soils.

There is a difference in the acidity of open water and of the marginal mat in acid bog lakes. This has its effects as for example in Oedogonium which will rarely reproduce sexually in open water but in the ditches, etc., of the marginal mat where there are different environmental factors it produces abundant fruiting bodies. When these lakes are shallow enough the produce a greater number of species than any other type.

The alkaline bog lakes are usually formed by oxbows with kettle hole depressions being formed in streams and not being completely cut off. They are in general poor in bulk and numbers of species.

The use of chlorophyll measurements is at least indirect evidence of productivity is shown to have merit. The importance of and quantities of CO_2, ogygen, light, nitrogen, phosphorus and bottom deposits are pointed out in a general way by the author in his discussion of Geographic Features and Algal distribution. These are brought out again in more detail in a chapter on relationships of phytoplankton to lake productivity.—Herald D. Bennett, West Virginia University.

A New Taxonomy Textbook.*—The most outstanding textbook in plant taxonomy to appear in recent years has just been published, bringing together in one volume a vast amount of material heretofore available only in widely scattered references. Its author, Dr. Lawrence, professor of botany at the Bailey Hortorium, Cornell University, cites information from more than 400 bibliographic entries.

The book is divided into two parts, the first dealing with principles and practices of plant taxonomy, the second with descriptions of selected families of vascular plants. In the first section the author deals with such subjects as the history of classification, phylogenetic considerations, plant nomenclature, field and herbarium technique, floristics, and the literature of systematic botany.

In the second part, 264 families of vascular plants in North America (north of Mexico) are systematically described. About a page is devoted to each family, with over 4 pages for such families as the Leguminosae. Morphological considerations are given for each family, with numerous well-executed sketches illustrating taxonomic

*Taxonomy of Vascular Plants. George H. M. Lawrence. Macmillan. New York. 1951. xiii-823 p. $7.95.

features. Important genera are listed and economic aspects are discussed. Monographic or other important literature references are given for each family.

This book presents for the first time in English the type of information that has been published by Wettstein, Engler, Diels, and other European botanists and should be of immense value to taxonomists of North America.

The book is attractive in its manufacture and to date this reviewer has found no typographical errors.—Earl L. Core, West Virginia University.

A New Edition of a Familiar Text.*—One of the outstanding texts in general botany for the last ten years, "The Plant World", now comes out in revised edition. As in most elementary botany texts, the material naturally falls under two general categories, 1st, the treatment of flowering plants as to structure, physiology, and reproduction, and 2nd, the classification of the plant kingdom. In the Fuller text they are treated in the order mentioned. The text includes much factual material and provides a sound technical basis for the training of students contemplating careers in botany or in some of the applied sciences. The practical aspects of plant life which are involved in everyday experience are stressed in the revision, considerable space being devoted to the properties and uses of wood and one chapter to the consideration of soils, relation of roots to soils, soil management, conservation, etc. Up-to-date additions to the sections on heredity, plant breeding, ecology, evolution, and conservation are included. A section on hydroponics, the growing of plants in nutrient solutions, is appended; likewise one on the production of seedless fruits by treatment with hormones and related substances.

The "new classification" of the plant kingdom is used, presenting thirteen phyla rather than the traditional four phyla: Thallophyta, Bryophyta, Pteridophyta, and Spermatophyta. The material on plant phyla has been augmented and rearranged in an effort to comply with requests for an expansion of this part of the text. "This new organization presents, first the distinguishing features of each group as a whole in a uniform scheme, then the details of structure and reproduction of representative orders, families, or genera of each phylum."

*"The Plant World". 2nd ed. Harry J. Fuller, Univ. Illinois. Henry Holt & Co., New York. 1951. 769 pp. $4.75.

At the end of each chapter one finds an extensive summary, a list of references of suggested readings, and a list of review questions. Also included in the text is a valuable glossary of technical terms, and some 400 illustrations, many of which are new.

"The Plant World", revised, is a comprehensive, well written text, with more than usual emphasis on physiological aspects of the subject. To this reviewer, it would seem that this text might well be used for a full year's work in elementary botany rather than a one semester course as intended by the author. The book is a handy size, not too heavy, important words of text are in boldface type, print and illustrations are clearcut; all in all, a very acceptable, up-to-date botany text.—NELLE AMMONS, WEST VIRGINIA UNIVERSITY.

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